MAP 1: GEOLOGIC MAP OF THE MOUNT VERNON AND PISCATAWAY QUADRANGLES, MARYLAND

By
John D. Glaser
1978

STATE OF MARYLAND
DEPARTMENT OF NATURAL RESOURCES
MARYLAND GEOLOGICAL SURVEY
Kenneth N. Weaver, Director

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Maryland Geological Survey
Johns Hopkins University
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QUADRANGLE LOCATION

EXPLANATION

ALLUVIUM

Qal

Interbedded sand, gravel, and silt-clay.

Fine to very coarse gravel, sandy gravel, and sand; massive to laminated silt-clay, in places with organic matter including leaves, twigs, and logs; mottled silt-clay; and rare peat. Color tan, brown, pale gray to very dark gray. These are heterogeneous, generally very poorly-sorted materials, commonly showing little stratification and strongly reflecting the composition of the source sediments. The dominant lithology associated with streams draining the Southern Maryland Upland is quartzose gravel and sandy gravel, commonly coarse with cobbles and boulders. In contrast, alluvium in the floodplains of streams crossing the Potomac River Lowland areas is mostly sand and silt-clay with considerably less gravel. Qal also includes a number of small tidal marsh areas underlain by dark organic-rich mud, as well as a few narrow sand beaches bordering the Potomac River.

Qal underlies stream channels, floodplains, and adjacent low areas, and is the record of channel and overbank deposition mostly during the last 10,000 years.

Thickness 2 to 15 feet.

TERRACE DEPOSITS

Qt

Interbedded sand, clayey sand, and pebbly sand; minor gravel and silt-clay.

Fine to coarse-grained clayey sand, predominantly quartzose but glauconitic in places, and subordinate quartz gravel. Color tan, brown, reddish-brown, or gray. Terrace deposits include mostly heterogeneous materials, poorly-sorted, massive to well-stratified, the latter mostly flat-bedded. The greatest concentration of gravel is in the terraces flanking Piscataway and Mattawoman Creeks; in contrast, the extensive Qt flats bordering the Potomac River are underlain by mostly sand and clayey sand containing scattered pebbles, cobbles, and boulders.

These sediments are fluvial in origin, the product of Late Pleistocene terrace deposition by the major streams of the area.

Thickness 3 to 25 feet.

MINOR TERRACE DEPOSITS AND COLLUVIUM

Interbedded sand, clayey sand, and gravel; massive, poorly-sorted to unsorted clayey sand with pebbles and cobbles.

Sand, fine to coarse-grained, and predominantly quartzose gravel; flat-bedded to massive; uppermost portion commonly pebbly loam. Color tan, brown, or gray. Lithologically similar to Qt. This composite unit includes a narrow band of partially dissected older terrace deposits flanking the major streams of the area, and mantling much of the Potomac River Escarpment; these deposits predate the deposition of Qt. Included here also are minor patches of gravelly colluvium, mostly on gentle slopes, which are inseparable from the terrace deposits at this scale.

Thickness 3 to 20 feet.

BRANDYWINE FORMATION

Tb

Sand, pebbly sand, and gravel; capped by sandy, pebbly loam in places.

Sand, medium to coarse-grained, poorly-sorted, interbedded with pebbly sand and medium to coarse gravel. Sand predominantly quartzose, pebbles are quartzite, sandstone, and chert; portions of deposit closest to Potomac River contain small percentage of crystalline rock clasts including gneiss, phyllite, and schist. Basal beds include sporadically-distributed boulders up to 7 feet in length. Color pale-gray to orange-brown. Bedding mostly lenticular, cross-bedded to massive. Where least dissected, uppermost Tb is as much as 15 feet of yellowish to reddish-brown pebbly loam.

The Brandywine Formation is fluvial in origin, and was presumably deposited by the ancestral Potomac River during the time span between Late Miocene and Early Pleistocene.

Thickness 3 to 40 feet.

CALVERT FORMATION

Tc

Sand, clayey to silty; diatomaceous silt; and minor clay.

Homogeneous sand, very fine to fine-grained, clayey to silty. Color olive-green to olive-gray where unweathered, tan or brown in weathered sections. Includes in basal portion one or more beds, totaling as much as 15 feet, of olive-green diatomaceous quartz silt containing up to 40% diatoms; diatomaceous beds thin to northeast and are absent in the area north of Piscataway Creek and west of Timbers Creek. Basal few feet of Calvert Formation contains in places admixed coarse sand, small quartz pebbles, black phosphate clasts, and vertebrate remains including shark teeth. Bedding obscure; most common sedimentary structure is burrow-mottling. All of the outcropping Calvert belongs to the lower member (Fairhaven); the overlying Plum Point Marls present only in subsurface of southeastern part of map area. Molds and casts of mollusks common, but shells seldom intact.

The lower Calvert probably accumulated in a restricted marine basin, whereas the upper portion of the unit records a more-normal middle shelf environment.

Thickness 3 to 70 feet.

NANJEMOY FORMATION

Tn

Sand, clayey, glauconitic in part; and silt-clay.

The dominant Nanjemoy lithology over much of the map area, especially to the south and east, is fine to medium-grained, very clayey sand, containing variable amounts of glauconite but seldom exceeding 25% of the sand fraction. Grain size and glauconite amounts decline both upward thru the Formation and northward, as does total thickness. Color medium-gray to dark greenish-gray. Exposures west of Timbers Creek typically show less than 20 feet of very fine to fine-grained gray quartz sand and silt with considerable clay matrix. The basal Nanjemoy contact is sharp with sand, in most places containing abundant shell hash, resting on and filling burrows in gray Marlboro Clay. Fossil mollusks, predominantly Venericardia, are common in layers and thin bands thru much of the unit. Indurated layers and concretionary bodies are also distributed thru the Nanjemoy. Along the western edge of the map area, the Nanjemoy pinches out and is overlapped by the Calvert Formation.

The Nanjemoy is a product of inner shelf deposition in relatively shallow marine waters; the absence of glauconite in most of the westernmost exposures attended by increasing amounts of woody debris suggests shoaling conditions.

Thickness 3 to 80 feet.

MARLBORO CLAY

Tm

Clay, dense, and subordinate silt.

Predominantly clay, brittle to slightly plastic, pale-red to silvery-gray, finely laminated to massive, bedding irregularly lenticular to hummocky; interbedded with yellowish-gray to reddish micaceous silt and clayey silt in lenses up to 24 inches in thickness, evenly laminated to cross-laminated, lignitic. Typically, the uppermost few inches to 8 feet of the unit are gray in color, and the remainder red; in places, the lower few feet are also gray. The Marlboro thins northeastward over the map area and is ultimately overlapped by the Calvert Formation. Exposures along the Potomac Escarpment consist typically of 3 to 10 feet of gray silty clay with numerous silt interbeds and considerable lignitic debris.

The Marlboro Clay probably accumulated in very shallow marine or brackish water, perhaps in part a tidal flat environment.

Thickness 3 to 30 feet.

AQUIA FORMATION

Ta

Sand, variably glauconitic, and calcareous sandstone.

Sand, very fine to fine-grained, clayey to silty, containing trace amounts to as much as 25% of glauconite; interbedded with layers and concretionary zones of calcareous sandstone, friable to hard rock, up to 5 feet thick. Color dark greenish-gray to medium gray. Upper contact sharp, burrowed, with thin wispy beds of Marlboro Clay introduced into the upper few inches of Aquia sand. Fossils are abundant in the Aquia within the map area; the fauna is dominated by large Turritella, Ostrea, Cucullea, and to a lesser extent Venericardia.

The Aquia comprises sediments of the shallow marine shelf, probably deposited in less than 200 feet of water.

Thickness 40 to 150 feet.

MONMOUTH FORMATION

Kmn

Sand, clayey to silty; and basal gravel.

Sand, very fine to fine-grained with considerable silt-clay matrix, with basal gravel up to 2 feet in thickness, comprised of vein quartz pebbles up to 2 inches diameter in dark-gray silty clay matrix, partially gypsum-cemented. Color mottled dark-gray to brownish-gray. Exposures of the Monmouth Formation are restricted to the bluffs fronting the Potomac River and Piscataway Creek in the vicinity of Fort Washington; here the unit is 15 feet or less in thickness. The Monmouth exists in the subsurface over at least the northern half of the map area where it increases to 50 feet in thickness.

The Monmouth is the oldest marine unit in the section mapped; deposition took place on the inner shelf, but the basal transgressive gravel probably records very shallow water.

Thickness 15 to 50 feet.

MAGOTHY FORMATION

Kma

Sand, silt-clay, and subordinate pebbly sand.

Sand fine to medium-grained, well-sorted to muddy, in places lignitic, white to pale-gray in color; interbedded with laminated, dark-gray, carbonaceous silt-clay, and some dense chocolate clay. The Magothy also contains minor interbeds of medium to coarse-grained pebbly sand or gravel.

Within the mapped area, the Magothy Formation is confined to the subsurface of the Piscataway Quadrangle.

Thickness 3 to 50 feet.

PATAPSCO FORMATION

Kp

Clay, silty, and minor sand.

Clay, silty, tough, massive; mottled pale-gray, red, and tan; sporadic thin lenticular beds of tan clayey sand. Like the Monmouth, the Patapsco Formation is exposed only along the Potomac River in the westernmost portion of the map area. In these outcrops, the upper 20 feet or less of the unit can be seen. Upper contact sharp, unconformable.

The Patapsco Formation is the record of alluvial sedimentation on a broad flat coastal plain.

Thickness 400 to 650 feet.

QUATERNARY — HOLOCENE / PLEISTOCENE
TERTIARY — PLIOCENE / MIOCENE / EOCENE — PAMUNKEY GROUP / PALEOCENE
CRETACEOUS — UPPER CRETACEOUS / LOWER CRETACEOUS

contact — generally approximate or inferred; dashed where concealed by Minor Terrace Deposits - Colluvium unit

fossil locality

fault — U - upthrown side; D - downthrown side

MOUNT VERNON QUADRANGLE
U.S. Geological Survey, 7½ Minute Series, 1965 (photorevised 1971)
Contour Interval 10 Feet
Datum is Mean Sea Level

PISCATAWAY QUADRANGLE
U.S. Geological Survey, 7½ Minute Series, 1957, (photorevised 1971).
Contour Interval 20 Feet
Datum is Mean Sea Level

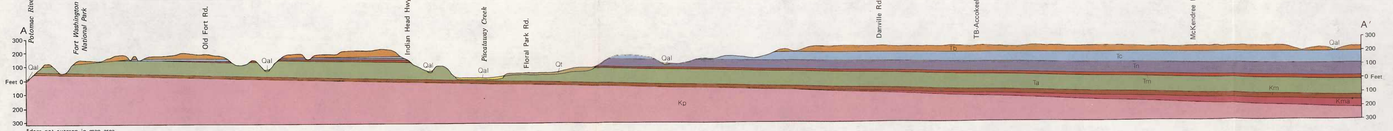
SCALE 1:24000

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

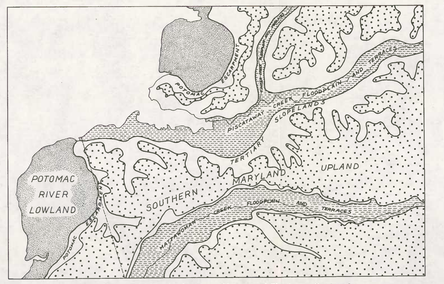
Map scribed by Margaret P. McCabe.

ENGLISH-METRIC CONVERSION SCALE

CROSS SECTION A-A'
Horizontal scale = map scale
Vertical scale x 7



*does not outcrop in map area



Physiographic divisions in the Mount Vernon and Piscataway Quadrangles

Williams & Heintz Map Corporation, Washington, D.C. 20027

INTRODUCTION

This map is an inventory of past and present mineral operations and potential mineral resources in the Mount Vernon and Piscataway Quadrangles. Currently, sand and gravel from the Brandywine Formation (Tb)* is the only resource utilized. In the past, sand and gravel was taken from the Terrace deposits (Qt). Other resources that were once used include brick clay from a clay bed in the Terrace deposits on the southern side of Broad Creek and a ferruginous clay in the Patapsco Formation (Kp) at Fort Washington for dyeing thread.

In all, over 974 acres have been disturbed by the mining industry for local, commercial and industrial uses. Approximately 29% of this area is currently being worked, or used for plant and storage sites. About 36% of the exploited land has been reclaimed. This total includes areas that have been graded, planted, developed, or otherwise utilized. The remaining 35% represents acreage that has not been reclaimed and is not being worked at present. However, these figures do not reflect the small operations whose dimensions and exact locations have been obliterated through time. The following chart gives a status report on disturbed land:

Inactive And Abandoned Acreage	Reclaimed Acreage	Working Acreage	Total Acreage
339.6	351.6	283.6	974.8

The information presented here was compiled from literature research and field investigations (1975-1977). Aerial photographs were used to help delineate the extent and location of the operations [Department of Agriculture, 1:20,000 photographs (1938, 1952, 1963, 1970) and Photo Service, Inc. (1972)]. Special thanks are given to Dr. John D. Glaser of the Maryland Geological Survey for the information and assistance he provided, and to Ms. Anne B. Newman for her help in the field.

PRESENT AND POTENTIAL RESOURCES

Sand and Gravel: Extensive deposits of sand and gravel are found in the Brandywine Formation. The maximum thickness is generally 30 to 40 feet, but locally up to 70 feet. In undissected upland areas, the sand-gravel portion of the unit is overlain by as much as 15 feet of sandy loam. Screen size analyses of sand and gravel samples (See Figure 1) indicates an average composition of 65.7% gravel (>4 mm), 32.4% sand (>1/16 mm) and 1.9% silt and clay. The gravel is almost wholly quartzose, consisting of sandstone, vein quartz, and chert. The chert is no longer chemically reactive thus permitting its use in concrete. Within the map area there are seven operations currently working this deposit for construction and fill materials.

Discontinuous Sand and Gravel: Sand and gravel occurs as interbeds in the Terrace deposits adjacent to the major creeks in these quadrangles. The deposits are primarily sand, clayey sand and pebbly sand with greater concentrations of gravel upstream. The thickness of the entire unit ranges from 3 to 25 feet, but the thickness of the economic sand and gravel beds, where present, is variable. The terraces along Piscataway Creek were worked at one time. While there are no current operations in these deposits, economically exploitable sand and gravel may remain. In the past, sand and gravel was dredged from the low southern banks and tidal flats of both Piscataway and Broad Creeks and from the bed of the Potomac River. The earliest recorded dredging operation was started in 1899. In 1971 the Maryland Assembly passed a bill (1969 Edition, Code of Public Local Laws of Maryland, Art. 9, Sec. 337A) that prohibited dredging in the Charles County portion of the Potomac River.

Clay: The laterally continuous, homogeneous, red and gray Marlboro Clay (Tm) has economic potential in these two quadrangles. It is a moderately plastic, kaolinitic clay with minor organics and silty partings. The thickness of the clay increases to the southeast and reaches a maximum of 30 feet. Although the formation is not being exploited at present, firing tests (Glaser, 1971) show the clay to be suitable for face brick and structural tiles. In the past, the Marlboro Clay from other areas has been used for common pottery, smoking pipes, tiles and bricks.

Diatomite: Diatomite or diatomaceous silt occurs in the Mount Vernon and Piscataway Quadrangles in the lower Calvert Formation (Tc). The bed contains up to 40% diatoms and can be as much as 15 feet thick with the thickness decreasing to the northwest. The map pattern shown indicates diatomite deposits in outcrop or with minimum overburden. A chemical analysis of the diatomite at Fairhaven Bluffs (Glaser, 1971) shows the following:

SiO_2	84.1%
Al_2O_3	4.4
Fe_2O	2.6
CaO	1.1
MgO	0.4
K_2O	1.0
Na_2O	0.9
TiO_2	0.9
Ignition Loss	4.5
	100.9%

Although diatomite has not been exploited in the map area, it offers a potential source of material for filtration media, insulation, absorbent, or filler material.

* For the boundaries and more information on this and all other specific geological deposits mentioned in this legend, please refer to Map 1 of this atlas.

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DESCRIPTION OF OPERATIONS

1 Local operation, intermittently working
2 Contee Sand and Gravel Co., Inc., Thom pit, working
3 Inland Materials, Inc., partially reclaimed, working
4 Southern Maryland Aggregates, Inc., working
5 A.H. Smith, working in area
6 Prince George's Bank Run Gravel Corp., working
7 Lone Star Industries, Inc., new operation, working
8 Charles County Concrete Co., plant and storage area, portions reclaimed or overgrown

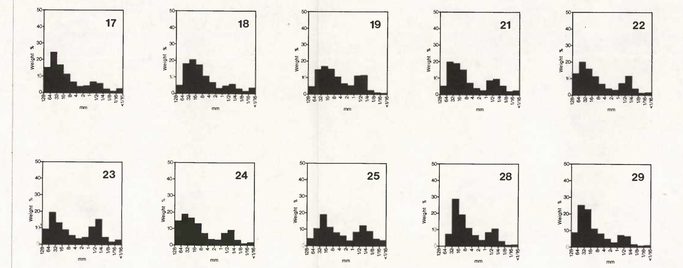

Figure 1. Histograms of screen size analyses from selected sand and gravel samples. Numbers refer to approximate sampling locations on the map (Schlee, 1957).

MAP SYMBOLS

- ●1 Working operation, see Description of Operations
- ▲ Reclaimed operation
- ✕ Abandoned or inactive operation
- Boundary of larger operation
- Sand and gravel
- Discontinuous sand and gravel
- Clay
- Diatomite
- Indicates where deposit may be overlain by minor terrace deposits and colluvium

MOUNT VERNON QUADRANGLE
U.S. Geological Survey, 7½ Minute Series, 1966 (photorevised 1971)
Contour Interval 10 Feet
Datum is Mean Sea Level

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

PISCATAWAY QUADRANGLE
U.S. Geological Survey, 7½ Minute Series, 1957, (photorevised 1971)
Contour Interval 20 Feet
Datum is Mean Sea Level

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

MAP 2: MINERAL RESOURCES AND MINED LAND INVENTORY, MOUNT VERNON AND PISCATAWAY QUADRANGLES, MARYLAND

By
Karen R. Kuff

1978

STATE OF MARYLAND
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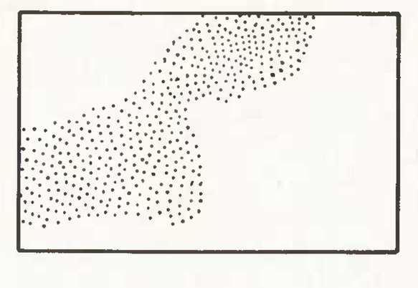
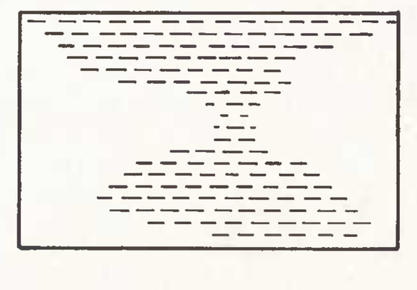
BOUNDARIES OF AREAS DELINEATED ARE APPROXIMATE ONLY. DECISIONS CONCERNING SPECIFIC SITES REQUIRE ON-SITE INSPECTION.



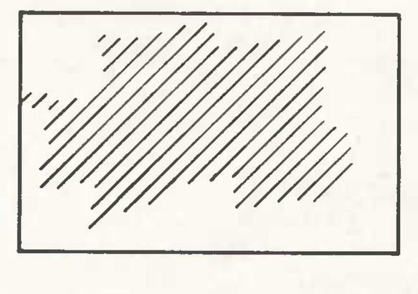
FLOOD PLAINS

Flat areas underlain by deposits of sand, silt, clay, and gravel; organic material common; water table high with swampy conditions prevalent in many places; part or all of flood plain subject to flooding.



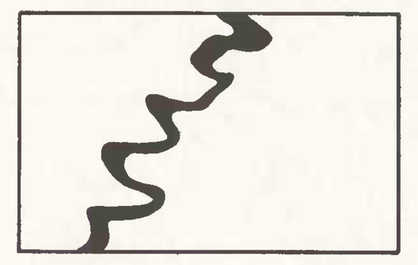
POORLY DRAINED LOWLAND FLATS

Relatively flat lowland areas underlain by silty or sandy clay and fine clayey sand with low permeability. The water table is relatively high in most of these areas, particularly in Spring. Moreover, surface drainage can be very poor, with swampy conditions prevalent over large portions of the flats. Septic systems may function poorly.



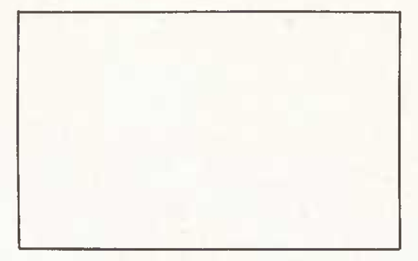
UPLAND AREAS WITH HARDPAN

Flat to gently rolling upland terrain underlain by silty or sandy loam containing a slowly permeable hardpan about 2 feet in thickness. The hardpan (or fragipan) generally occurs at a depth of about 2 feet, and as a consequence of its relative impermeability, surface soils tend to remain saturated and swampy during wet seasons, or exceptionally dry during droughty periods. Shallow septic systems may function poorly.



AREA UNDERLAIN BY CLAY

Outcrop belt of Marlboro Clay—a thin stratum, up to 30 feet in thickness, of pale-red, stiff clay, exposed at surface mostly along steep slopes. During wet periods, water movement along clay surface creates conditions favorable for slope failures and landsliding. Plans for construction on or above clay outcrop should include provision for adequate drainage of clay bed surface.



NO GENERAL CONSTRAINTS ON LAND USE OR SIGNIFICANT GEOLOGIC HAZARDS.

MAP 3 : GEOLOGIC FACTORS AFFECTING LAND MODIFICATION

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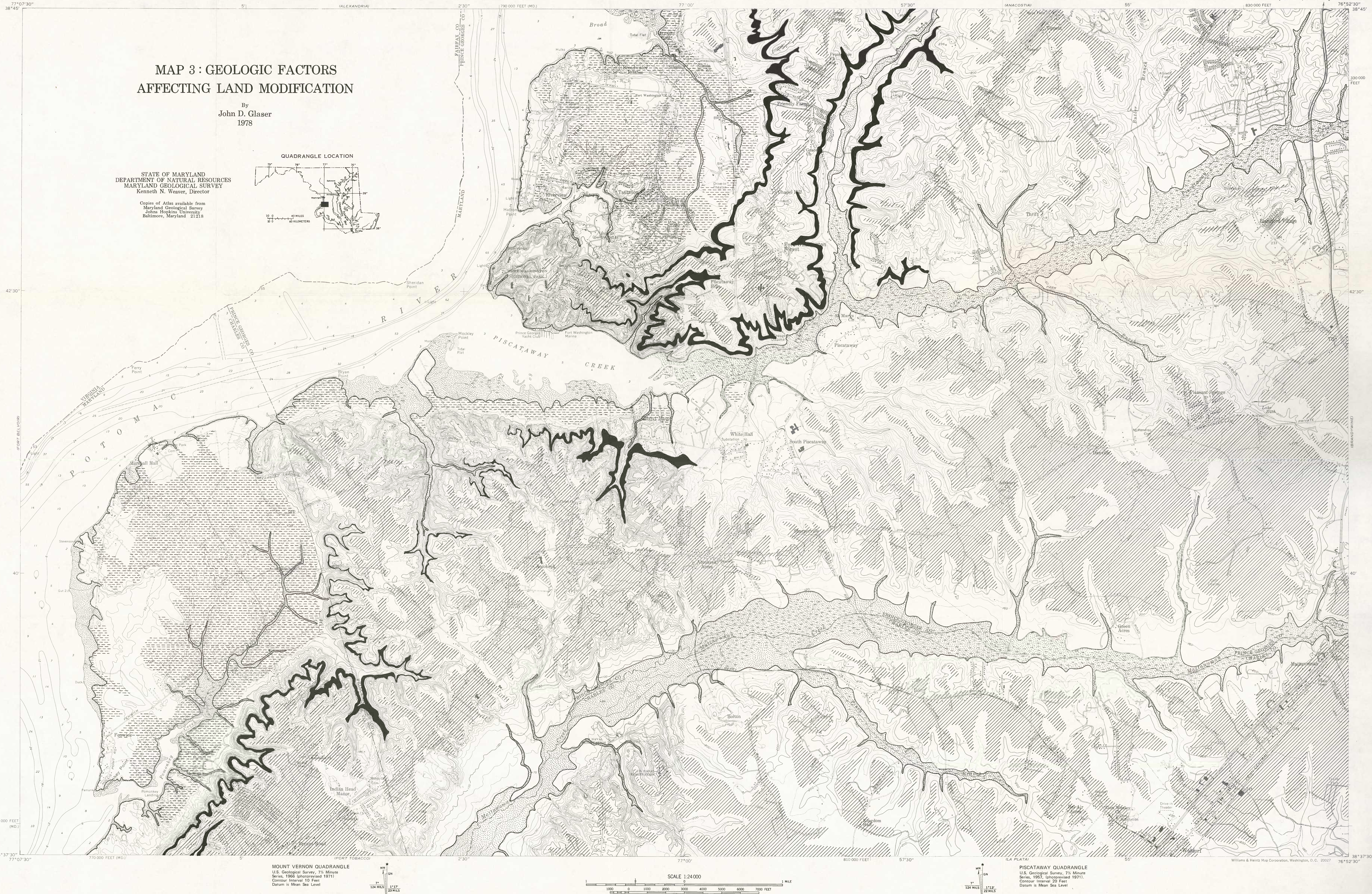

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SCALE 1:24 000

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QUADRANGLE ATLAS NO. 8

MOUNT VERNON AND PISCATAWAY QUADRANGLES GEOLOGIC AND ENVIRONMENTAL ATLAS

By

John D. Glaser and Karen R. Kuff

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